

# **Moose Creek Flat River Access Improvement Implementation Report**



**Phase 1 Construction**  
**Phase 2 Streambank Bioengineering**

**November 27, 2017**

# MOOSE CREEK FLAT RIVER ACCESS IMPROVEMENT IMPLEMENTATION REPORT

*by*

Jeff Dunn, Watershed Hydrologist

**RESPEC**

3810 Valley Commons Drive, Suite 4  
Bozeman, Montana 59718

*prepared for*



PO Box 160513  
Big Sky, Montana 59716

November 27, 2017

## TABLE OF CONTENTS

Table of Contents.....	i
1.0 Introduction .....	1
2.0 Installed Practices .....	1
Boat Ramp Installation.....	3
Kayak Launch Installation .....	4
Rock Terrace Installation.....	5
Trail Installation .....	6
Bioengineered Streambank Installation .....	7
3.0 Before, During and After Photos.....	8
Boat Ramp – Viewed from Upstream .....	8
Boat Ramp – Viewed from Downstream .....	9
Kayak Launch – Viewed from Upstream .....	10
Kayak Launch – Viewed from Downstream .....	11
Rock Terrace – Viewed from Upstream .....	12
Rock Terrace – Viewed from Downstream .....	13
Site 2 – Bioengineered Streambank – Viewed from Upstream .....	14
Site 2 – Bioengineered Streambank – Viewed from Downstream .....	15
Site 3 – Viewed from Upstream .....	16
Site 3 – Viewed from Downstream .....	16
Site 5 – Viewed from Upstream .....	17
Site 5 – Viewed from Downstream .....	17
Trail and Walk-in Access Points .....	18

# 1.0 INTRODUCTION

The purpose of the Moose Creek Flat River Access Improvement Project is to reduce streambank erosion by focusing river access to designated locations and enhancing the surrounding riparian vegetation along the Gallatin River. Project implementation conducted in fall of 2017 included the construction of a boat ramp, kayak launch, and rock terrace, along with trail construction, streambank bioengineering, and riparian plantings with willow cuttings. Additional riparian plantings with containerized vegetation and fencing will occur in the spring of 2018. Installed practices and before, during and after photos documenting the construction and planting process are summarized in this report.

## 2.0 INSTALLED PRACTICES

Installed practices in the fall of 2017 include:

### **Boat Ramp**

The boat ramp was constructed using approximately 43 cubic yards of concrete. The toe of the boat ramp was secured using riprap from the Cascade Pit, which was covered with a layer of river cobble excavated from the site. Grooving was applied to the surface of the boat ramp using grooving tools provide by Montana Fish, Wildlife and Parks.

### **Kayak Launch**

The kayak launch was constructed using six placed stones weighing an estimated 26 tons, along with additional rock salvaged from the old bridge abutment, riprap from the Cascade Pit, and river cobble to secure the toe and tie into the boat ramp on the downstream end and the bioengineered streambank on the upstream end. Each tier of stone was encased in concrete.

### **Rock Terrace**

The rock terrace was constructed using 29 placed stones weighing an estimated 93 tons, along with additional rock salvaged from the old bridge abutment, riprap from the Cascade Pit, and river cobble to secure the toe and tie into the bioengineered streambank on the downstream end and the natural streambank on the upstream end. Each tier of stone was encased in concrete.

### **Trail**

Four sections of trail were completed totaling approximately 1,120 feet, including approximately 790 feet of elevated trail through the campground, approximately 80 feet of reconstructed trail leading from the parking lot to the rock terrace, and approximately 250 feet of trail connecting the parking lot to the kayak launch and the boat ramp. The contractor intends to perform touch-up work on the trail in the spring of 2018.

### **Bioengineered Streambank**

A 145-foot long section of streambank extend from the rock terrace downstream to the kayak launch was restored using bioengineering techniques. Approximately 3,000 willows were placed in four layers between fabric encapsulated soil lifts at a spacing of 3-7 willows per linear foot for an overall density of 21 willows/linear foot. In addition, 300 willows were placed vertically in the streambank using a stinger. Willows were harvested between October 23<sup>rd</sup> and October 27<sup>th</sup> and placed in the streambank between November 9<sup>th</sup> and November 14<sup>th</sup>. All willow cuttings were soaked in the Gallatin River for a period of 2-

3 weeks between harvest and planting. Willows were harvested from various sites in the Gallatin canyon, including Porcupine Creek, Storm Castle Creek, Spanish Creek, and the Gallatin River at Greek Creek. In addition, sandbar willows were harvested in the Gallatin valley. Harvested species included Booth's willow (*Salix boothii*), Bebb's willow (*Salix bebbiana*), Drummond's willow (*Salix drummondiana*), sandbar willow (*Salix exigua*), and Geyer's willow (*Salix geyeriana*).

#### **Riparian Plantings**

Riparian plantings conducted in the fall of 2017 included the placement of willow cuttings using a stinger at Sites 3 and 5, with 83 cuttings placed in Site 3 and 94 cuttings placed in Site 5. An attempt was made to use the stinger at Site 1, but the substrate was too coarse. Additional riparian plantings with containerized vegetation are planned for the spring of 2018.



## BOAT RAMP INSTALLATION





## KAYAK LAUNCH INSTALLATION





## ROCK TERRACE INSTALLATION





## TRAIL INSTALLATION





## BIOENGINEERED STREAMBANK INSTALLATION





### 3.0 BEFORE, DURING AND AFTER PHOTOS

#### BOAT RAMP – VIEWED FROM UPSTREAM



Boat Ramp – 6/4/14 (~4000 cfs)



Boat Ramp – 9/25/17



Boat Ramp – 10/4/17



Boat Ramp – 10/4/17



Boat Ramp – 10/4/17



Boat Ramp – 10/10/17



## BOAT RAMP – VIEWED FROM DOWNSTREAM



Boat Ramp – 9/26/17



Boat Ramp – 9/26/17



Boat Ramp – 10/4/17



Boat Ramp – 10/4/17



Boat Ramp – 10/12/17



Boat Ramp – 10/12/17



## KAYAK LAUNCH – VIEWED FROM UPSTREAM



Kayak Launch – 9/26/17



Kayak Launch – 10/20/17



Kayak Launch – 10/24/17



Kayak Launch – 11/9/17



Kayak Launch – 11/13/17



Kayak Launch – 11/22/17



## KAYAK LAUNCH – VIEWED FROM DOWNSTREAM



Kayak Launch – 6/4/14 (~4000 cfs)



Kayak Launch – 5/18/16 (~2000 cfs)



Kayak Launch – 10/20/17



Kayak Launch – 10/24/17



Kayak Launch – 10/25/17



Kayak Launch – 11/22/17



## ROCK TERRACE – VIEWED FROM UPSTREAM



Rock Terrace – 6/4/14 (~4000 cfs)



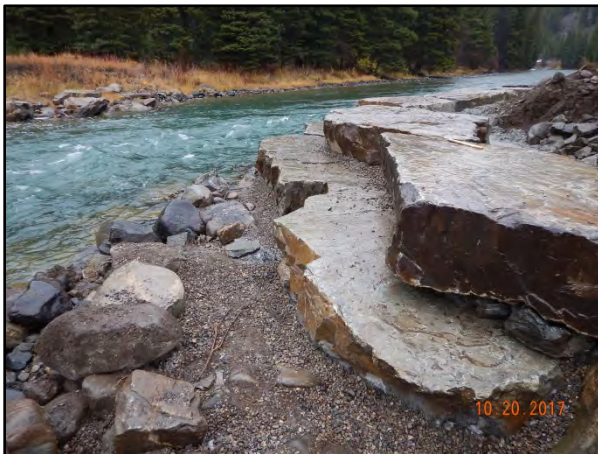
Rock Terrace – 10/4/17



Rock Terrace – 10/5/17



Rock Terrace – 10/6/17



Rock Terrace – 10/20/17



Rock Terrace – 11/22/17



## ROCK TERRACE – VIEWED FROM DOWNSTREAM



Rock Terrace – 5/18/16 (~2000 cfs)



Rock Terrace – 10/5/17



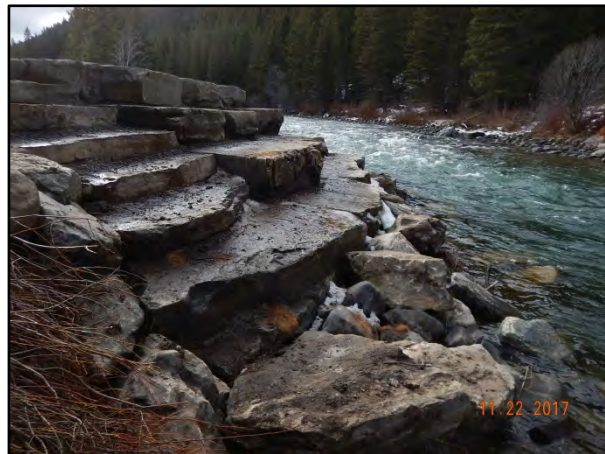
Rock Terrace – 10/20/17



Rock Terrace – 10/25/17



Rock Terrace – 11/13/17



Rock Terrace – 11/22/17



## SITE 2 – BIOENGINEERED STREAMBANK – VIEWED FROM UPSTREAM



Bioengineered Streambank – 5/18/16 (~2000 cfs)



Bioengineered Streambank – 9/26/17



Bioengineered Streambank – 9/26/17



Bioengineered Streambank – 11/10/17



Bioengineered Streambank – 11/22/17



Bioengineered Streambank – 11/22/17



## SITE 2 – BIOENGINEERED STREAMBANK – VIEWED FROM DOWNSTREAM



Bioengineered Streambank – 5/18/16 (~2,000 cfs)



Bioengineered Streambank – 9/26/17



Bioengineered Streambank – 11/10/17



Bioengineered Streambank – 11/10/17



Bioengineered Streambank – 11/10/17



Bioengineered Streambank – 11/22/17



### **SITE 3 – VIEWED FROM UPSTREAM**



**Site 3 – 3/24/17**



**Site 3 – 11/22/17**

### **SITE 3 – VIEWED FROM DOWNSTREAM**



**Site 3 – 5/18/16**



**Site 3 – 5/18/16**



**Site 3 – 11/22/17**



**Site 3 – 11/22/17**



## SITE 5 – VIEWED FROM UPSTREAM



Site 5 – 10/23/14



Site 5 – 11/22/17

## SITE 5 – VIEWED FROM DOWNSTREAM



Site 5 – 3/24/17



Site 5 – 6/3/15



Site 5 – 11/15/17



## TRAIL AND WALK-IN ACCESS POINTS



Trail – 9/26/17



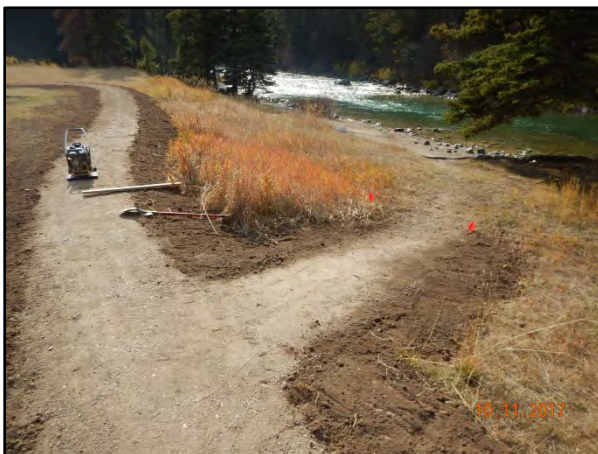
Trail – 10/20/17



Walk-in Access #1 – 3/24/17



Walk-in Access #1 – 10/18/17



Walk-in Access #2 – 10/11/17



Walk-in Access #3 – 10/18/17